Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
[Gorman et al. 2021](#) USA RCT Level 1 N=50	**Objective:** To determine the amount of sessions needed to achieve adequate exoskeletal-assisted walking skills and velocity milestones. The secondary aim was to investigate whether this intervention would improve bowel function in comparison to usual activity. **Population:** Female: 24% 72% paraplegic Time since injury: 52% greater than two years, 48% six months to two years 62% AIS A and B, 38% AIS C and D **Treatment:** Exoskeletal-assisted walking (EAW) vs. usual activity in a crossover RCT design – all participants appeared in both groups, and were randomized which condition they did first or second. **Outcome Measures:** 10 Question Bowel Function Survey, the BSS, and the short-form item bank for Bowel Management Difficulties from the SCI-Quality of Life instrument	1. From the 10Q Bowel Function survey, 12% reported reduced need for external help, 24% reported reduced evacuation time during a session and for a full week following EAW sessions. 2. The BSS showed greater improvements in stool consistency after EAW (loose stool changed from 19.1% pre-EAW to 9.3% post-EAW) more so than after usual activity (19% pre-UA to 15.2% post-UA). 3. Between men and women, the percentage of men with loose stool decreased with EAW (22.2 to 9.1%) whereas the percentage of women changed from 9.1% to 10%. 4. The BSS showed people with a motor complete injury had improvements in stool consistency (23.3% pre-EAW to 6.9% post-EAW) whereas people with incomplete injuries had worsening (11.8% pre-EAW to 14.3% post-EAW). 5. For the Bowel Management Item Bank components of the SCI-QOL, there was a statistically significant improvement regarding bowel management difficulties during the EAW phase for those who started in the UA-first group (improvement in satisfaction from 49.5 ± 9.2 to 46.5 ± 9.8 (p=0.028)).
[Kwok et al. 2015](#) Australia and UK RCT Level 1 ([PEDro](#)=8)	**Objective:** To determine the effects of a 6-week standing programme on bowel function	1. No significant mean between-intervention difference for any outcome measure.

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome

N=20	in people with spinal cord injury.
	Population: N=20 (15M, 5F) wheelchair dependent SCI community members
	Median (IQR) age:
	    Treatment first group: 46 (39-55)
	    Control first group: 46 (42-51)
	Median (IQR) time since SCI:
	    Treatment first group: 4 (3-11)
	    Control first group: 9 (6-20)
	15 cervical, 5 thoracic
	AIS-A/B: 13/7
	Treatment:
	Standing phase: participants stood on tilt table for 30min, 5 times/week
	No-stand phase: participants did not stand
	Crossover with:
	  6 weeks of standing/no-stand phase +
	  4 weeks of washout phase +
	  6 weeks of no-stand/standing phase
	Outcome Measures: time to first stool, time to complete bowel care, Neurogenic Bowel Dysfunction Score, Cleveland Clinic Constipation Score, St. Mark's Incontinence Score, SCI-SET
		2. Median (IQR) of perceived change in bowel function is 0/10 (0-3).
		3. Median (IQR) of inconvenience is 5/10 (0-7).

Huang et al. 2015 China RCT	**Objective:** To compare the effects of body weight-supported treadmill training	1. Significant interactions in defecation time and enema dose between both groups.

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
Level 2 (PEDro=5) N=24	(BWSTT) and robot-assisted rehabilitation (RAT) on bowel function in patients with spinal cord injury with respect to defecation time and defecation drug dose (enema). **Population:** N=24 incomplete SCI from T8 to L2, less than 6 months post-SCI Body weight supported treadmill training (BWSTT) group: N=12 (7M, 5F) Mean (SD) age 38.4 (2.25) RAT group: N=12 (9M, 3F) Mean (SD) age 41.7 (2.25) **Treatment:** 20min BWSTT or robot-assisted training (RAT) sessions 4 times per week for 1 month **Outcome Measures:** defecation time, glycerine enema dose	2. Significant within-group decrease in enema dose (68.1±10.7mL to 38.8±12.4mL) and defecation time (93.0±14.7min to 64.5±11.6min) in RAT group (p<0.01). 3. No significant within-group change in enema dose and defecation time in BWSTT group.
Hubscher et al. 2021 USA Prospective controlled trial Level 2 N=22	**Objective:** To investigate whether the urogenital and bowel functional gains previously demonstrated post-locomotor step training after chronic spinal cord injury could have been derived due to weight-bearing alone or from exercise in general. **Population:** Female: 9% Age: mean 32.6 y Time since injury: 5.3 y Level: 12 cervical, 10 thoracic Severity:	1. The overall NBD score did not change pre-/post-training for any of the three training groups examined. The results indicate that most of the scores fall within the ranges clinically interpreted as moderate to severe levels of dysfunction. 2. Although we have previously found a significant decrease in time required for defecation after LT20, no significant pre-/post-training differences (p>0.05) for either stand or arm crank were found.

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
	11 AIS A 7 AIS B 3 AIS C 1 AIS D **Treatment:** Approximately eighty daily one-hour sessions of either stand training or nonweight bearing arm crank ergometry. Comparisons are made with previously published locomotor training data (step; N=7). **Outcome Measures**: Assessments at both pre-and post-training time-points included cystometry for bladder function and International Data Set Questionnaires for bowel and sexual functions	
[Mazor et al. 2016](#) Australia Prospective controlled trial Level 2 N=21	**Objective:** to compare anorectal biofeedback (BF) outcomes in patients with incomplete motor spinal cord injury and neurogenic bowel dysfunction with a group of functional anorectal disorder-matched control patients **Population:** N=42 controls Age: 51 (17) y Female: 81% N=21 SCI with NBD Age: 50 (17) y Female: 81% Level: 10 lumbosacral, 4 thoracic, 2 cervical, 3 cauda equina, 2 unknown	1. Following anorectal biofeedback therapy, symptom scores significantly improved in both groups, as did effect of bowel disorder on QOL. 2. The SCI group had larger improvements in constipation score compared with the control group (40% vs 27%, respectively, P=0.04) whereas the reduction in FI weekly episodes was not significant between the two groups (p>0.05) 3. Both the SCI and control groups had a significant improvement in bowel function control (p<0.05 for both groups) 4. Within-group decrease in first sensation threshold (75±53 to

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
	Severity: 13 ASIA D, 3 ASIA C, 3 Cauda equina syndrome Etiology: 17 traumatic 8 UMN 13 LMN **Treatment:** Anorectal biofeedback 30-60 min/session, once a week for 6 weeks **Outcome Measures:** The Knowles Constipation Questionnaire and the Fecal Incontinence Severity Index were calculated before and after treatment for constipated and FI patients, respectively. A 10cm visual analogue scale was also used before and after treatment for impact of bowel dysfunction on quality of life, patient satisfaction with bowel movement, and feeling of control over bowel function. Physician assessment and follow-up questionnaires	64 ± 65mL) and max anal resting pressure (62 ± 19 to 53 ± 21mmHg) in SCI group, but not in controls. 5. Within-group increase in sustained squeeze duration (23 ± 9 to 31 ± 14s) in controls, but not in SCI group. 6. Individuals with SCI and NBD improved sensory and motor anorectal function, including lowering of first sensation threshold and more effective balloon expulsion. Improvement in balloon expulsion time was correlated to Faecal Incontinence Severity Index and constipation score improvements ($p<0.05$). 7. The improvement in Faecal Incontinence Severity Index score was correlated with improved feelings of bowel movement control ($p=0.003$) 8. 10/11 SCI group reported stable or improved bowel symptoms at long-term follow-up.
[Hubscher et al. 2018](#) USA Prospective controlled trial Level 2 N=12	**Objective:** Locomotor training (LT) as a therapeutic intervention following spinal cord injury (SCI) is an effective rehabilitation strategy for improving motor outcomes, but its impact on non-locomotor functions is unknown. Given recent results of our labs' pre-clinical animal SCI LT studies and existing overlap of lumbosacral spinal circuitries controlling pelvic-visceral and locomotor	1. Within the activity-based training group, time required for defecation significantly decreased from 57.9 minutes to 35.7 minutes ($p=0.022$). 2. Within the activity-based training group, medication usage for bowel, and bowel emptying method remained unchanged. Frequency of fecal incontinence, frequency of defecation, and oral laxative usage changed although these findings were not significant.

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
	functions, we addressed whether LT can improve bladder, bowel and sexual function in humans at chronic SCI time-points (> two years post-injury). **Population:** SCI Locomotor Training (LT) Group N=8 Level: 4 AIS A, 1 AIS B, 2 AIS C, 1 AIS D Age: Mean 27.4 years, SD 6 years old Duration: Mean 4.3 years, SD 3.8 years % Female: 38% SCI Usual Care (Non-Trained) Group N=4 Level: 2 AIS A, 1 AIS B, 1 AIS C Age: Mean 30.3 years, SD 5.2 years Duration: Mean 6.7 years, SD 2.6 years % Female: 0% **Treatment:** 80 daily sessions of body-weight support treadmill training (BWSTT) (1 hour per session) or locomotor training plus weight bearing standing (1 hour each day). One trainer assisted the pelvis and hips while each leg was assisted by a trainer. Locomotor training vs	

Author Year; Country Score Research Design Total Sample Size	Methods	Outcome
	non-trained group **Outcome Measures:** The International Spinal Cord Injury Data Sets Questionnaires for Urodynamics and Lower Urinary Tract Function (adapted by C.H. Hubscher to include average number of nightly bladder emptying/day) and for Bowel Function (adapted by C.H. Hubscher to include an expansion of the average time required for defecation).	